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JOHN KANE.

## THE MINE BOSS AND HIS RELATIONS TO THE OPERATOR AND MINER.

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BY JOHN KANE.

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*Mr. President, Gentlemen of the Institute :*

The selection of this subject by me is not as much from a belief on my part that it offers more scope for my adaptabilities than something else that I might discuss, as from the belief that it is a subject that ought to be discussed by some one, and that that some one might as well be myself as any one else. In saying this I am reminded of a short introduction I once heard Colonel Ingersoll make to his famous, or infamous, depending on what side you view it from, lecture on the Bible. Said he: "Somebody ought to tell the truth about the Bible. The preachers won't do it; the professors won't do it; the teachers won't do it; the deacons won't do it, and so on, so I thought I would do it myself." Those of you who have heard the colonel of course have already formed your ideas as to whether he spoke the truth or not. Like him, however, on the question of theology, I on the question of mining have been waiting for abler men to not as much tell the truth, as to tell more of it in their papers and in the debates in this Institute. I have heard you for the past few years discuss learnedly and brilliantly on the machinery, the chemistry, and the physiology of the mine, but I have not heard a word about the health, or the happiness of the miner. With you it has been a hybrid question of economics and science, and having waited for these years to see you include on your agenda the question of humanity, and having waited in vain, I concluded, a la Ingersoll, to bring it in myself.

But you will perhaps say, what has the mine boss and his relations to the operator and miner to do with humanity? We will see. One day last week I heard a coal operator say, Pshaw, just as soon as this agitation among the miners came up for the abolishment of the company stores we voluntarily done away with ours; it wasn't paying us a thousand dollars a year. During the winter of '94-'95 Governor McKinley appointed a commission to investigate the conditions of the miners of the Hocking valley. That commission made an official report and declared

that the miners of that valley had not earned over \$67 for the whole year. Look at the picture, a coal company spurning the paltry sum of \$1,000 profit per year on a mere side issue, and miners of that same company living on 27 cents a day. Now I am not going to bring in here any sentiment or attempt to make you the victims of a stereotyped labor speech. I merely introduce the foregoing to show you that there are real live issues in connection with the great industry of mining outside that of the size of an atom or the shape of a molecule and will try to show how the mine boss stands in the midst of all these questions.

In the first place I hold that coal, soot, smoke, mud, clay, coke, iron and all the other useful and useless matter won, or removed in the pursuit of any given industry is not the end itself of anything, but the means to an end, and sometimes a very disagreeable means at that. The end is, or should be, the happiness of mankind, and a society of servants, which I am sure this Institution is, notwithstanding my own membership in it, that engrosses itself absolutely in the mechanical and chemical side of any question, to the total repudiation of the social side is making a very great mistake, if it believes for a moment that its ultimate total of benefaction to the State, to the Nation or to humanity will ever reach that maximum that it should be its duty to attain to.

As a proof of what I say, I ask you who have traveled to give me your impressions of the physical appearance of the miners you have seen in your travels. Go to the mines in the North of England, for instance, where for years, aye for centuries, one is almost justified in saying, the grossest inhumanity and carelessness was practiced by coal operators, mine bosses and scientific men such as you are, towards the mining youths of those regions, which was carried on right up to within the last fifteen or twenty years, and which in isolated cases is still carried on, and tell me what you find. Do you not find a race of men whose forefathers were the equals probably in stature and physical proportions and rugged mental equipment of any on the face of the globe, now stunted, dwarfed and rickety, eternal monuments and victims to a century of greed and avarice pursued by the land owners, colliery proprietors and mine bosses of that region; and while there is perhaps no other spot on the earth containing as many expert mining engineers, nor where mining is carried on as systematically and scientifically (if we leave out the question of mining by machinery, which, owing to the extreme disadvantages there to be overcome on that point render machines almost impracticable) still it all combined does not compensate for the physical deterioration of men which has taken place there, which I am glad to

say, however, the legislators of the nation are trying to amend by wholesome laws on hygiene, and by the restriction of hours and compulsory education laws, which I hope may in the end prove efficacious.

But, while entertaining this hope, I cannot forget the words of the gentle Goldsmith, who sang in response to the grief he felt at the destruction of the men and women of sweet Auburn, who to satiate landlord greed were wiped off the green hills of Ireland to make way for sheep:

Ill fares the land, to hastening ills a prey,  
Where wealth accumulates, and men decay.  
Princes and lords may flourish or may fade,  
A breath can make them, as a breath has made,  
But a bold peasantry, their country's pride,  
When once destroyed can never be supplied.

The mine boss has a vital part to play in the things merely hinted at in the foregoing. What should a mine boss be from the operator's standpoint? What should he know? What should he be capable of? Of course a good deal will depend upon the kind of operator he is called upon to serve, and perhaps it would be a more legitimate first question to ask what should he be from his own standpoint? I think every one will admit that at least in his own estimation he should be a man, not only that but a gentleman. And this estimation to be of any utility presupposes on his part the possession of a conscience, for an estimation resting on a piece of barbaric pulp, which I hope does not answer for a conscience, in any mine boss or mine superintendent of Ohio—although I have personal knowledge of such being the case in some parts of the country—would be useless as a prop to personal self-respect. A mine boss should by all means be a sober, temperate man. Other things being equal the mine operator should always prefer the man for boss or superintendent who is, along with his other qualifications, a total abstainer; and if he has been a total abstainer, or at least a temperate man for a series of years or for life, so much the better, for although I admire the man whose passions have been so strong and have conquered him so often that, up to recently he was a disgrace to mankind, but who has at last mustered up sufficient fortitude and strength of mind as to absolutely cut off the occasion of his criminality, still, if there is any man I detest in this world, it is the recent convert to religion or temperance, who, as soon as he has cultivated the traditional sanctimonious fiddle face, starts out on a mission of anathema against every poor devil who hasn't just got his eyes open as soon as himself.

And yet, even he I would prefer as mine boss, and would make some allowance for certain deficiencies which of a necessity we must find in him, to the man who drinks. I had the honor some few years ago to represent the widows and orphans of the victims of a mine catastrophe in Pennsylvania, where nearly two hundred men lost their lives, before the coroner's inquest, and, while the jury did not return a verdict incriminating anybody, it is a fact which is on record, that witnesses testified that the boss whose duty it was to examine the place in which the explosion occurred, was the night preceding the explosion drinking.

I myself have personally witnessed mine foremen who were in the habit of spending their evenings in the back parlor of the saloon, guilty of acts which have jeopardized their own and hundreds of other men's lives in the mine—but I was too young at the time, and too much inured to the dangers of the mine, and consequently indifferent to the actual situation to do what I should certainly do now, take steps to prevent a repetition of such acts. Alcohol is a mental poison, and a man in whose hands are placed the lives and property of other men should not only be selected from among his fellows for his mental strength, but he should never be permitted more than once to vitiate and weaken that mentality and the sound judgment accompanying it by alcoholic liquors and hold his place. Besides the deterioration of mind that drink implies, there is something else connected with it. The man who spends his time over the glass has no time for that mind culture without which he, in these rapid times, is going to very soon become a back number. This evil habit predisposes men to the most foolish things that our race is guilty of, and without dwelling further on this phase of the subject, I will say that were I the operator of a mine, or the spokesman of the miners of that mine, not one life, nor one cent's worth of property should be placed at the discretion of a man who was guilty of frequenting the place or partaking of the fluid which the world grants is the greatest robber of discretion in the known world.

Before leaving this point, however, I desire to add, that man who takes a glass now and again is not necessarily a failure as a mine boss, for I have known many such who could not be excelled, but such men are the exceptions which prove the rule, and to them the slight sacrifice necessary is well worth making, which would place them absolutely on the side of safe men.

A mine boss should, above all things, measure well across the eyes; all noble animals do this, and a mine boss should be noble and magnanimous in spirit, to gain and hold that influence which is necessary he should wield for the best interests of all con-

cerned. If he is narrow in spirit, peevish, easily frustrated, prone to take mean advantages, his men soon discover it and, in turn, instead of respecting him and wishing him well in the pursuit of his occupation will take every advantage of him that opportunity affords. They will lie to him and steal from him at every turn, feeling justified in doing so from the fact that they have to deal with one who is not honest himself and one who cannot appreciate the honesty and faithfulness when exercised by subordinates.

A mine boss should be educated; and when I speak of education here I don't mean altogether that cramming process which enables a man to pass successfully an abstruse, technical examination to-day, but which would be useless to help him to follow that up in lifting a ditched mine car onto the track to-morrow—and I make use of this illustration because it is one recalled to my mind by an actual personal experience. When only about fifteen years of age, I was employed as dilly boy. One day I waited for upwards of an hour of the loaded cars coming out of one of the districts of the mine supplying my double parting. Presently the mine superintendent, who had just recently been employed in that capacity, came out to ask me to go in to a place where the driver's trip had been ditched. He and the driver, along with a trapper boy, had spent fully an hour, to the loss of both the company and the miners of that particular district, in trying to place the cars on the track again—in fact I believe he, the superintendent, who though nine or eleven years older than myself at the time was only a young man, injured himself in his exertions and his excitement. I went in and for a few moments surveyed the position of the cars, and with the deft manipulation of a plank as a lever had the cars on the track in less than ten minutes. And yet this young superintendent had not many months preceding that occurrence received a certificate of mine manager, and, from the theoretical side, could tell more about the properties and power of the lever in ten minutes than I could in a month. He knew all about the laws of gravitation, the laws of falling bodies, the atomic weights of different elements, etc., and yet that ditched car was too weighty for him, a man five or six years beyond his majority, while I, yet a mere boy, found it an easy task. What is the explanation? Simply this, I had done more raising of weights with that, which after all is the only thing that raises weights—actual force—and actual physical force at that, than he had. He had been lifting weights by theory, by imagination; I had been lifting them by actual daily, painful practice for the past four years. This is always the way with exclusively theoretical men. And yet, I am not one of those who make a demigod of people who boast of their igno-

rance of theory and boom their practical equipment. Like everything else, this question of theory versus practice has a happy medium about it which mine owners would do well to strike. The man who knows nothing but theory, nor the man who knows nothing but practice are neither of them fit to manage the operation of a mine; but of the two I for my part would place my interests, no matter how reluctantly, in the hand of the practical, experienced man. But, I hold that, in this age of educational opportunity no man should assume the duties of such a responsible position without both a practical and theoretical knowledge of the science of mining. To do justice to his employer the mine boss should have a tolerably fair knowledge of human nature—that is, he should have some knowledge of himself. He should have a fair knowledge of the constituents of the atmosphere he breathes; he should know a good deal about atmospheric pressure, and how it acts and reacts on the barometer, and the other instruments, such as the thermometer, and so on, that are used to register its condition. He should also know what that condition implies in the remote recesses of the subterranean chambers submitted to his care in the bowels of the earth. He should know all the names of the different gases found in the mines, not only by their common names, but when he sees their formulæ in the language of the chemist he should be able to identify them, and explain their respective natures. He should understand the peculiarities of the strata underlying and overlying the coal that is being excavated under his charge; he should be able to tell with a tolerable degree of certainty as to whether a certain piece of roof strata will fall within a given time, or whether it will fall at all or not during the probable progress of operations in its vicinity. He should know something about the nature of different kinds of timber, and how best to use and economise it so as to make the mine safe. He should know how to dilute the noxious gases being given off in the mine, so as to render them harmless. He ought to know how many squares of the inch there are in a safety lamp, and be able to explain what principle or law of chemistry it is that makes that piece of gauze wire a means of safe lighting in a gaseous mine. All of these things of course imply that he has received a fair common school education, or what is just as good, or perhaps better, that he has consumed goodly quantities of the midnight oil.

If a man knows tolerably well the things above enumerated—no matter whether he has gone to college or not—and the other hundred and one things which are incidental to them, and is honest, active, vigilant and of a fairly sensitive disposition he should make a good mine boss from either the operator's or the miner's



standpoint. Do the operators of Ohio always employ men to manage their business for them of the kind I spoke of? I don't know, but I am reliably informed by a man who has filled the position of district mine inspector in this State, that a mine boss who was requested to send more air into a given airway, had proceeded to fill that airway up to within about a foot of the roof with dirt, and when asked why he had done so, answered, "Why, I always notice that the 'closer' the airway is the bigger noise and rush the air makes, and I thought it naturally caused more air to pass through." I hope that mine inspector exaggerated when he told me this, or I hope that that mine boss was a rare example of a rare genus which is fast disappearing, if it has not already disappeared from the bosships of mines in this State. I do know, however, that many operators employ men as bosses more on account of their brutal character than of the knowledge they possess. This is a big mistake. I never yet knew a brutal foreman to get as good results out of a mine as the man who understood his business, no matter how gentle and easy-going the latter was. A despotic man to be successful should either be ubiquitous or employ a staff of pets and spies. He cannot be ubiquitous, consequently must employ the pets, and spies, whom you may depend upon it, don't spy for their health, and, if they are not paid in current coin they take it out in shirking the work they are supposed to perform, knowing that their brutal and despotic patron will favor them for their subserviency and dishonor. The man who has the kind of mind which is indispensable to success in managing a mine is never a despot of the kind I have reference to—and, while speaking of this subject of despotism let me quote a few lines from that great French historian and statesman Guizot, on this very matter. Guizot, speaking of despotism, says: "There are great varieties in despotism; I do not merely speak of great inequalities as regards the degree of despotism, but of great varieties in the very nature of despotism and in its effects. For some men absolute power has scarcely been more than a means; they were not governed by merely egotistical views; they turned over in their minds plans of public utility, and made use of despotism to attain them. Charlemagne, for example, and Peter the Great in Russia, were true despots, but not exclusively egoistical despots, occupied solely with themselves, consulting merely their own caprices, acting only with a personal end in view. They, each of them in his own country, had general and disinterested views and wishes concerning the destiny of men, views in which the satisfaction of their own passions held but the least place. Despotism, I repeat, was for them a means, not an end—a means vicious in its nature, and

which carries evil into the bosom of the good which it accomplishes; but which serves, at best sometimes, to hasten the progress of good while giving it an impure alloy.

"For other men, on the contrary, despotism is the end itself, because they blend egoism with it; they have no general views, form no design of public interest, seek in the power of which they have the disposition, the satisfying of their possessions and caprices, of their miserable and ephemeral personality."

It is a long jump from Charlemagne and Peter the Great to simple mine bosses, I admit, but the great man's words that I have just quoted apply in all relations of life.

My paper being already too lengthy, and being pressed for time, I leave many of the essential parts of this question to be filled in by discussion or by your own imaginations.

PRESIDENT ORTON: Gentlemen, I am sure that I voice the sentiment of all here when I say that we are in debt to Mr. Kane for a paper which appears to me to be singularly apropos in this convention. Especially so are the opening remarks in which he rightfully scores the Institute for taking too much thought of the strictly mechanical side of the question. I think myself we ought to have given more prominence to the other side and am glad to welcome Mr. Kane as the champion of the other side. The subject is now open for discussion.

MR. LOVE: The only mistake which I see that Mr. Kane has made in his paper is his apology in the outset. I do not think he owes any apology to the Ohio Institute of Mining Engineers for the introduction of this paper, for a discussion of this subject is something that has long been needed here. I heartily agree with the entire paper from beginning to end. In any case, a man is not a mule, nor should he be treated as such, whether he be Hungarian, Italian, or other nationality; and the more kindly you treat him the more he will do for you. I increased the output of a mine four hundred tons per day, and I think I can safely say that I never mistreated a man in my employ. A mine boss who uses tyranny is not a success. There are undoubtedly mine bosses in Ohio who neglect their duty and who do not live as they should; but in comparison with other states, I think the condition in Ohio is about as good, if not a little better, than most states, with less

disaster. I believe the mine bosses in Ohio are not as well posted theoretically and practically as in some places, yet they average fairly. I agree heartily with Mr. Kane that practice should be connected with theory, and think the exclusive use of either one alone to a great extent is a mistake.

PRESIDENT: My earliest experience in the mines was with a mine boss who could not write his own name. Everybody in the district told me he was an elegant mine boss, nevertheless. I doubt not many of you gentlemen know of just such cases. Should a man be allowed to act as mine boss in these days who cannot write his own name, even if he is a good, practical man?

MR. RICHIE: I helped to fill out a man's blank not long ago to send to Mr. Haseltine. He could not write at all.

MR. HASELTINE: A mine boss?

MR. RICHIE: Yes, sir. As far as Mr. Kane's paper is concerned, he has not said one thing but is valuable to miner and operator, and I think part of it would do to read at the Anti-Saloon League meeting, too.

MR. HAUGHEE: The question of education in managing mines has always been of great interest to me, not only in regard to Ohio, but other states. I have known, and do yet, of mine bosses whose education is very limited. I do not know whether the limitation would be expressed by saying they could not write their names, but I know it is so limited they cannot measure the air in the mine. I know their practical knowledge of mining is very perfect, and a great deal more so than mine bosses I know of in other states who have quite a good education,—education sufficient to stand the examination and manage mines. In two instances in Illinois, I know where mine bosses are managing mines, in two places which I can name if necessary, where bad management resulted seriously. In one case, after the shaft was sunk and work was started off, they commenced taking nearly everything before them, leaving very limited pillars. The result was a squeeze, with loss of time and money. Another man who got papers for mine boss lost his

life by not having practical knowledge of the dangers to be encountered in shafts. These men were educated sufficiently to stand the examination and hold certificates. The question as to whether an uneducated man should be allowed to manage a mine I think should be considered. I can't answer it. I know of good men who are not educated who manage mines. Mr. Kane's paper was a splendid one and deserves the thanks of the society.

MR. JONES: I do not agree with the declaration made by the gentleman who preceded me as to the excellency of the paper read. It is one of those ingeniously constructed papers that it would be pretty difficult to take exceptions to, and only a gentleman being possessed of the discriminating character like Brother Kane could have done that. I do not believe, Mr. President, that it is the function of this Institute, or ought to be the function of this government to say to a man, if he possesses all the qualifications necessary save and except the ability to write, that should of necessity debar him from accepting and filling the position of a mine boss. I believe the competition in that direction ought to be free and open to everyone, regardless, Mr. President, of the fact as to whether he might have had the opportunity for scholastic attainments in his youth, or in his previous career. I agree with Mr. Kane's objection to drinking men, and think it ought to be the duty of every man who owns or works in and around mines to deprecate and discourage always and everywhere, the practice of a man taking a drink. I believe that upon that proposition rests more perhaps than we are willing to concede. I believe we ought to discourage that everywhere, but I do not subscribe to the doctrine that a man should be derbarred because of his inability to write. I know a man who is the most practical man in the State of Ohio, who produces the best results, who is managing a mine in what is known as the Number Six vein and is able to extract ninety-three and one-half per cent. of the coal therefrom—something unprecedented in the mining history of Ohio—and he cannot sign the blanks sent to Mr. Haseltine.

MR. HUGHES: I have been interested in the remarks of the last gentleman. Presuming that this man who produced ninety-

three per cent. of the vein would put six months' application of his evenings to general education, would he not have been able to produce ninety-four or ninety-five per cent.? It seems to me that the remarks resolve themselves into the question, Is education a benefit or not?—either in coal mining or selling dry goods. The later remarks seem to indicate that one can get along about as well without. Just so long as ignorance is at a premium among miners you will produce minimum instead of maximum results.

MR. LOGAN: I heartily corroborate what Mr. Kane says in his paper throughout, but I have one question I would like to ask to make clear his meaning. Supposing you, Mr. Kane, were going to open a coal field and had the choice of two men, one incompetent and not well educated, and the other more intelligent and thoroughly posted, the first at fifty and the other at one hundred dollars. The first, through ignorance makes a great many blunders, necessitating bailing water, but through his domineering nature compels the men to bail the water for nothing—frightens them into doing it. Or he might drive so he cannot ventilate properly and the men are compelled to work in bad air. Ultimately, this man is able to put out as much coal as the other man who drives the head as it should be, avoids all unnecessary expense and permits the men to work with health and safety. As between these two men, one at fifty dollars and the other at a hundred, which would you hire?

MR. KANE: I do not know whether I understand Mr. Logan's question entirely. Is it, which of two men I should employ, a brutal man or a gentle-minded man, if I could save fifty dollars on the brutal man?

MR. LOGAN: I would like to know how much you would sacrifice for a good, honest fellow?

MR. KANE: You mean to say the brutal man will compel the miners to do something which would otherwise not be done, and works for fifty dollars a month less than the other mine boss? That is a hypothetical question, Mr. Chairman, and I have never known of such a case. It is possible for any member of the Insti-

tute to construct a question which neither by theory nor practice anybody in the world could answer. (Applause.) But I desire to say that as far as my knowledge goes, the man who understands his business is always more profitable than the man who attempts to get it out of the muscle of the workmen by sheer brutal force.

MR. GEORGE CARDING: I think it is well enough for the practical mine boss to have a knowledge of chemical analyses and all those things; but the practical mine boss wants to know when his mine is safe and when he is safe himself. How will he attain that knowledge? By being brought up in daily practical experience. How many thousand tons of coal are lost in the State of Ohio every year by ignorance. You may put in a man who can make plans and do all that sort of work, but he wants some practical ideas about it. One of the most successful men I know had charge of sixteen different shafts and could not write his name. On measuring day he took a boy out of the office to make the memoranda. When he did anything himself, he put a mark on a stick which he carried in his pocket. It was better for that company to keep a young man to follow him up and take his notes. In those sixteen different shafts, there are sixteen different coals,—some worked long wall, some room and pillar, with roofs of different character. Suppose they would put in a young man without the experience, though he might be as smart as possible as to knowledge and use every possible means to avoid losses or breakdowns and still fail. A big lot of theory and a big lot of practice works well. A mine boss should have a thorough knowledge of human nature. This day is too far advanced for a man to accomplish anything by being brutal. The mine boss should have a general knowledge of machine repairing, carpentering, care of horses, etc., so I claim a mine boss cannot be made in five minutes.

MR. PRICE: I have been very much amused at the arguments on the last paper, some of which have been very long-winded, and I do not propose to let the subject pass without having a few words to say. I am the oldest man in the house. I have followed mining since I was fifteen years of age and I am

now past three score years and ten, and as some of the men have been relating their experience, I must relate some of mine. I remember in 1850 leaving Kentucky upon the Great Sandy and going to Illinois. I was hunting for a good place to make money and had a companion, a Welshman. We got to a place where we decided to stop and my companion suggested, after we had selected a boarding place, that we go to the grocery, when we had had supper. We went to the grocery, which was a small room, probably fifteen by eighteen feet. There was a bar in one corner and a row of men pitching pennies into a tin cup. In another corner at a little table were some men playing cards, as they were also in another corner. In the bar stood the mine boss cursing and drinking. I had never been in such company before, and to make myself look big, I invited my companion to have a glass of ale, which we did and went back to our boarding house. And to think that the mine boss was in the bar! That was my experience at that time. But I want to say in response to the arguments here, that a mine boss can't know everything. His judgment cannot always be correct, and he ought not to be blamed when he has used his best judgment if he sometimes fails. I remember that about the time I took charge of the mine for the company I am working for to-day, I asked the president a question one day about hiring a man who was a stranger there. He said, "Mr. Price, don't ask me that question. This company hired you to run the mine and if you can't do it, we will get somebody else that can." That was enough. I have been with that company twenty-eight years and I have never seen the time that I have asked for anything I wanted but I got it; and they hold me responsible for the working of that mine and the cost of the coal. I have men who have worked for me for the whole of that twenty-eight years, and I have never had any occasion to scold them. I don't scold them: I expect them to attend to their duty and they do it. Again, I hardly ever have to change a driver. I hold the driver responsible for getting out that coal, and I don't run after him to see that he does it. I can't be every place. The paper that was read I appreciate very much and am glad it was read; but

some of us have got to talking clear off the subject. I move that the gentleman receive a vote of thanks for his paper.

(Motion seconded and carried.)

PROFESSOR RAY: Sitting here and listening to the remarks made, a person is apt to get the impression that education is really a detriment to a man's qualifications for work. I know that Mr. Kane did not intend that impression to be gathered from his paper, because I know he is a firm advocate of liberal education. But one would gather from the remarks made here that theory is some intangible accomplishment more for ornament than for practical use. I believe you will all agree with me in the statement I make now, that theory is correct practice. We are all surrounded by inflexible natural laws, and a theoretically educated man understands those laws and is governed accordingly. It is impossible to make water run up hill unless you force it; a stone will fall if held above the surface of the earth and released—laws control everything and these are in force at all times. A theoretically educated man understands these things to a greater or less extent, according to his ability; and the deeper his understanding is, the more valuable he is to his employer and to himself. A practical man becomes proficient in a certain line of work under certain conditions. What is he, if you change these conditions, unless he has some knowledge of theory also? It was a theoretical man who made it possible to mine in gaseous mines. It was a scientist, Sir. Humphrey Davy, who gave the miner the safety lamp, and it was developed by extensive experiments made with gases in a laboratory. That is an instance where a theoretical man made practical his theories, and it would not have been possible had his theories not been correct with regard to the laws of gases. It was Sir. Lothian Bell's theory of blast furnaces that made it possible for furnace managers to use all kinds of ore and limestone in blast furnaces.

I do not call a man educated who has crammed himself with a few facts and who would be able to pass a list of examination questions, just barely able to cross the line and receive a state certificate. I do not call him educated, though it would be possible for



him to become educated. A great many of our best men educate themselves and are men who stand shoulder to shoulder with college-bred men and are authority in their line. They made themselves familiar with the natural laws which surround matter, which no man can change. As I said before, the discussion going on here gave one the idea that theory or education was a sort of refinement which was nice to have, but still would disqualify one for their work. It does not, and the more a man knows, the better he is off,—but he must have common sense, and that we cannot make by education.

PROFESSOR LORD: I have been very much interested in this discussion, and think it is proving very conclusively, not that mine bosses need no education, but that they need more. I think we all agree on the fundamental question. I do not believe that any member of this Institute, which has been so very efficient in establishing the school of mines at the Ohio State University and always stood as one of the potent powers in endowing that school, for the increase of education in this State and others—I do not believe that any member of this Institute believes in any degree that it hurts a man to educate him. The only possible defect there can be, is to make him prominent before he is right. That is one danger connected with education, to make a young man think, because he has had a certain amount of education that he knows it all. That impression of knowing it all, is not restricted to educated men. I have seen it even in the case of the roughly practical men. It is a very bad thing, because then they stop learning more. Now, excepting the real fact upon which we all agree, that the more a man knows the better off he is, the real cause of discussion appears to be on account of the impression that we are going to put men without practical experience into places where practical experience is necessary, and that education is in danger of making the mistake of substituting a partial knowledge of principles for a full knowledge of conditions. In other words, that the attainment of a knowledge of facts can give judgment. After all, not only for the mine boss, but for anybody, the fundamental qualification should be good judgment. Good judgment comes by and

through practice. That is the only way in which can be attained that undefinable quality which consists in correctly inferring from conditions around you the condition of affairs. So that, in order to be a success and responsible, one must develop this judgment through experience and through practice. Therefore, it is unwise to put any man in a position of responsibility who has not shown judgment developed. Men differ in this. Education is merely a tool. You might say because there were excellent carpenters who did work with elementary tools, therefore better tools are of no advantage. I have in my study a desk which is a hundred years old, made in the times when carpentry was an art and made with comparatively crude tools of those days, but the joining is wonderful work, simply unsurpassable. I value it as a curiosity. The men were practical then and had certain crude tools to work with: at the same time, if these men were living to-day I doubt not that the best of them would be the quickest to appreciate every improvement in tools which are at hand. So it is with a man's education: it is a new tool and extends their range like a universal bit. You know that now they make a tool which will make any kind of a hole with one bit. An educated man adds to his other acquirements extensibility which qualifies him to fit any kind of a hole. The objection to putting a man without practice but merely education into a position where judgment acquired through practice is necessary, is a tribute to education. The demand to increased education exists all over the world and the tendency of this has been to create the mistake among people of thinking that merely because a man has been to school he is educated. I am speaking now as a practical educator, and in my business as an educator, I think I can train a man a great deal better than a man who has not had any practice in the business could do. Education is merely acquiring the experience of all men instead of the experience of one man, opening to a man what many men have seen instead of just what he has seen himself. Now the right thing is for every man to add education to practice. Coming back to this course at the university which this institution has helped to equip for the purpose of making educated, practical men. If a man has had experience in mines, it gives him the op-

portunity to add to it education. What is the result? Simply this—young men are turned out who have made and are making some of the most successful practical men in the country. Why? Because they had practical experience and added to it the extensibility of education.

MR. HASELTINE: I rise to thank Mr. Kane for his paper, and I think it one of the best papers, perhaps, that has been presented for discussion at the meetings within recent years and a subject which has been, as he very truthfully says, neglected. There has been a great deal said on both sides of the case, and both, perhaps, have been right in their position, while directly opposing. You ask me to explain that. Mr. Jones and quite a number have advocated a practical education as necessary for a good mine boss, and the better equipped he is with practical experience, the better man he is. Better experience without education than education without experience. We all take pride in the school of mines at the university, but as to talking of preparing young men at the university for mine bosses—that is not what those young men are after. They know too much to be mine bosses. They are training themselves for mine superintendents. The reason is that when they have acquired that education, they are prepared to fill other avenues of life which pay better wages than a mine operator is willing to pay for a mine boss. And if they cannot get positions as mine superintendents or mine engineers, they go to other avocations. There is a great difference between the place of superintendent and that of mine boss and I have held and always will hold that a mine boss must have practical education, whether he has any other or not; and whatever he is deficient in in that particular, must be made up by the superintendent or mine engineer.

PROFESSOR LORD: I want to say one word in reply to Secretary Haseltine. I know what I am talking about when I say we have had men at the university who have gone out as mine bosses; and we have had several short mining-course men who came there as practical miners, men who had been thirteen years in the work, who went back as mine bosses and some are to-day mine

bosses. Some went back as mine bosses and are now superintendents.

PRESIDENT ORTON: I don't think a man who had two years of college education would know too much to be a mine boss, though he might after having had a year or two experience as mine boss be able to take heavier work.

SECRETARY HASELTINE: I said the man knew too much to work for the wages.

PRESIDENT ORTON: Next in order will be a paper by Mr. T. E. Hughes, on Wire Rope Haulage—Its Uses and Abuses.

